E. J. BUTLER.

EMPIRE COTTON GROWING CORPORATION.

REPORT OF THE ADMINISTRATIVE COUNCIL OF THE CORPORATION SUBMITTED TO THE FOURTEENTH ANNUAL GENERAL MEETING ON MAY 28th, 1935.

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EMPIRE COTTON GROWING CORPORATION.

Annual Report

FOR THE SEASON

1933-1934.

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REPORT OF THE ADMINISTRATIVE COUNCIL OF THE CORPORATION SUBMITTED TO THE FOURTEENTH ANNUAL GENERAL MEETING, ON MAY 28TH, 1935.

In the introduction to last year's report it was stated that the past year had brought no relief to the depression which obtained in the cotton industry of this country. This statement unfortunately still holds good.

No doubt in some measure due to American restriction, but materially aided by the unremitting and far-reaching efforts of the last dozen years, the steady expansion of Empire growths has been fully maintained: the increase in the consumption of Indian cotton in this country has been even more striking, now that the extended use of Indian growths is a fundamental factor in Empire economic policy, and has been accepted by Lancashire as such.

As to the future, general economic confusion renders prophecy impossible. The only policy is for the Corporation to pursue their work, founded as it is on the low level of the production costs in most of its spheres of activity.

A further increase is again to be recorded in the total output of cotton from the producing countries of the Empire, excluding India. The crops in Uganda and the Sudan combined have always in recent years exceeded those of all the other countries put together, so that the total is determined mainly by the results in those two areas. In the season 1933-34 the Sudan showed some recovery from the low yield of the previous season, but, on the other hand, the Uganda crop fell short of the record crop of 1932-33. In other parts of Africa the efforts made by the several Governments to develop native production in order to alleviate thereby the effect of low prices were reflected in larger cotton crops. Notable increases in production have thus to be recorded in 1933-34 in Nigeria, Nyasaland and Tanganyika, the crop in the last-named being a record for the Territory in spite of bad weather having caused a heavy drop in yield in the Eastern Province. Queensland, also, after a succession of disappointing seasons, produced a record crop of over 20,000 bales. So far as forecasts are available at this period, further substantial increases can be looked for in many areas in the current season.

The drastic curtailment of acreage in the United States and restriction of the crop to be ginned has naturally led to an increase in the world consumption of outside growths, which, in the present season, has exceeded that of American cotton. In the existing circumstances, therefore, there should be no difficulty in securing markets for those Empire growths that are comparable with American, provided that the producing countries will do their utmost to ensure uniformity in the quality of their shipments, apart from those unavoidable fluctuations caused by variations in climatic conditions from season to season.

Personnel.

The Corporation have to report with regret the death during the past year of two members of Council, the Hon. Bernard Rollo and Mr. F. A. Tomlinson. Both had been members of Council since the formation of the Corporation; in addition, Mr. Tomlinson was a member of the Executive Committee and Mr. Rollo a member of the Finance Committee.

The following changes have taken place in the personnel of the Council since the last Annual Meeting:—Mr. M. D. Peterson, the representative of the Foreign Office, has been succeeded by Mr. R. I. Campbell, C.M.G., and Mr. L. Browett, the representative of the Board of Trade, by Mr. W. B. Brown, C.B., C.B.E. Dr. D. B. Meek, C.I.E., has been appointed Indian Trade Commissioner in succession to Sir Harry Lindsay, and has succeeded him also as a member of Council and of the Executive Committee. Mr. F. J. du Toit, recently appointed South African Trade Commissioner, has succeeded Mr. Dimond on the Council, Mr. Heaps, one of the representatives of the Federation of Master Cotton Spinners' Associations, has been succeeded by Mr. W. M. Wiggins, and Mr. S. B. Samoilys has been nominated by the Bombay Chamber of Commerce, while on leave, to succeed Mr. L. F. H. Goodwin as their representative.

The Corporation have been glad to have the opportunity during the past year to offer their congratulations to the following members of Council and others closely associated with the work of the Corporation, whose names have appeared in the Honours Lists:—The President, Lord Derby, The Royal Victorian Chain; Sir Thomas Robinson, K.B.E.; Sir Robert Archibald and Sir John Shute, Knighthoods; Professor Engledow, C.M.G., and Dr. Balls, C.B.E.

Mr. S. Milligan, the Corporation's senior representative in Africa since 1924, retired at the beginning of the year. The Corporation accepted his resignation with great regret, and he carries with him their good wishes and those of all members of the staff at home and abroad.

India.

The following note has kindly been supplied by the courtesy of the Indian Trade Commissioner.

During the year under review the imports of raw cotton from India into the United Kingdom improved considerably as can be seen from the figures given below. Figures are given both for short and long staple varieties in order to show how each of them has fared during the last three years :—

(In thousand centals of 100 lbs.)

Staple length under 1¼" and over ⅞".

	1932.	1933.	1934.
Imports from India...	266·1 ...	638·7 ...	847·6
Imports from all countries	9,896·9 ...	10,704·7 ...	9,431·2

Staple length ⅞" and under.

	1932.	1933.	1934.
Imports from India...	269·1 ...	450·7 ...	683·6
Imports from all countries	425·2 ...	565·3 ...	782·2

Amongst the factors which have caused this improvement must be mentioned (1) A general improvement in the total cotton imports from India. 1932 was a poor year as far as cotton imports from India were concerned, and in that year only 4 per cent. of the total imports of raw cotton into the United Kingdom came from that country; (2) The price parity has been moving in favour of India. In 1933-34 the price of Indian cotton (No. 1 Fine Oomra) was 75 per cent. of that of American middling, whereas the price parity for 1932-33 was 88 per cent.

But after making an allowance for these favourable factors, due credit must be given to the efforts made by the Lancashire Indian Cotton Committee to popularise Indian cotton in the United Kingdom markets. The activities of the Committee have been described at length in their first Annual Report, which has been issued recently, but some of the facts mentioned therein are of such importance and interest that they may be repeated here. The aim of the Committee is to encourage the industry, other things being equal, to "prefer Indian." Lists have been drawn up of spinners making yarn from Indian cotton and of manufacturers weaving cloth containing yarn made from Indian cotton, and steps have been taken to extend these lists from week to week by constant personal approaches and by practical demonstrations of the commercial and technical advantages of Indian cotton. An Advisory Panel has also been instituted in order to assist spinners desiring advice on technical matters.

Close co-operation has been maintained with the Shirley Institute in carrying out investigations on a number of specific points arising in the processing of Indian cottons. The results of these investigations have been published by the Shirley Institute, at the request of the Committee, in special memoirs.

A display was organised by the Committee at the British Textiles Exhibition in February, 1934, to show the wide range of products made with technical success and commercial advantage from Indian cotton. A special exhibition of Indian cottons and methods of processing them was also held at the Shirley Institute on 11th January, 1934, for the benefit of members of the British Cotton Industry Research Association interested in extending the use of Indian Cotton in Lancashire. There is no doubt that these activities have created a profound impression on the minds of buyers throughout the trade,

which, it is hoped, will be found useful should the price factor not remain as favourable as it has been in the immediate past.

It is interesting in this connection to study the distribution of the Indian Cotton crop. Roughly speaking, for the last three years India has been consuming as much of her own cotton as she has been exporting. Japan normally takes about half the exports from India, and the other half was exported in 1933-34, mainly to the United Kingdom, China, Italy, Germany, France and Belgium, the countries mentioned being in order of the value of their purchases in that year. In view of the increasing difficulties in the way of international trade, the efforts made by the Lancashire Cotton Committee to popularise Indian cotton will tend to stabilise India's position in the world markets.

Mention may appropriately be made here of the principal activities during the year under review of the Indian Central Cotton Committee. Its Agricultural Research Sub-Committee has examined the Committee's research schemes and laid down the principles which should be followed in future with regard to new schemes. The Sub-Committee attaches great importance to the question of the possibility of growing medium and long-staple cottons in areas at present growing short-staple cotton only, and has strongly recommended the Government of Bombay to set apart a compact block of 300,000 acres for the cultivation of long-staple cotton in Sind in the areas irrigated by canals from the Sukkur Barrage. The Committee has also financed two schemes, one in British territory and the other in the Baroda State, for the distribution and extension of 1027 A.L.F. cotton seed, which, after examination, the Committee found to be relatively superior to other varieties.

The Standards Sub-Committee formed last year has decided to prepare standards, not only for the four varieties, Bengals, Sind, Punjab-American and Sind-American, but also for other varieties, such as Oomras, Broach and Kumptas. The Committee has at present schemes in progress which it finances by grants-in-aid in Madras Presidency, Bombay Presidency, the Punjab, Central Provinces, the United Provinces and Burma, and in Hyderabad, Baroda and Bikaner. These schemes are concerned with the improvement of the various types of cotton and with the eradication of the various diseases and pests.

It is interesting to note that in the Central Provinces two new strains were tested during the year and under widely divergent conditions of soil and climate with most encouraging results. These two strains, Late Verum and Verum 434, are now ready to take the place of the old Verum 262, which, in spite of its good yield and popularity with the cultivator, was found susceptible to adverse climatic conditions. Late Verum spins up to 34's and is also the best yielder of all new strains. It is particularly suitable to a locality where the monsoon extends till late in the season. Verum 434 on the other hand, is recommended for localities of short duration of the monsoon.

The supplementary all-India cotton forecast for the 1934-35 season is as follows :—Area 23,830,000 acres ; crop 4,807,000 bales of 400 lbs. The corresponding final figures for last year were 23,925,000 acres and 5,006,000 bales.

Australia.

When this Report was issued last year excellent rains had fallen in the cotton-growing districts of Queensland, and the new crop had been planted under more favourable conditions than for many seasons past. The season generally proved to

be a good one during the growing period of the crop, and an improvement in yields was obtained in all but the Southern parts of the State. The crop produced was easily a record, and approximated to 22,000 bales of 400 lbs. The output would undoubtedly have been increased had it not been for a dry period in January which seriously affected the crop in most districts. Rain during the harvesting period also did damage and interrupted the picking at such frequent intervals that much of the cotton was left too long unpicked, with a consequent lowering of the grade, and boll rot in some districts.

The season at the Research Station was the best of any experienced since 1928, and experiments were carried to completion with reliable yields.

At the Station a good deal of attention has been directed to soil studies, especially to the effect of climatic conditions, such as rainfall, temperature and sunshine, on nitrate content. The Corporation have put the Director of Cotton Culture in touch with Rothamsted, who are interesting themselves in the problem, which apparently has an important bearing under Queensland conditions on the yields of cotton obtained.

The Director of Cotton Culture has also offered to co-operate with the Shirley Institute by supplying material to enable the Institute to study the effect of cultural operations on fibre properties. A request for co-operation of this kind was put forward at the Conference held by the Corporation last July, and it is satisfactory to know that there is a possibility of it leading to the development of closer working between those who are engaged in studying problems connected with the growth of cotton and those investigating the properties of the lint.

The season 1934-35 began slightly late, owing to delayed planting rains, but a good start was made and the condition was promising in most districts at the end of the year. Unfortunately, in January the rainfall took the form of exceptionally heavy storms from which the percentage of run-off was high, and for the most part only the surface soils were wetted. A good crop was set, but subsoil moisture was deficient and, with only light rains in February, shedding was severe. The situation improved later, however, owing to heavier rains. In March, when the last report was received prior to the writing of this Report, a reliable estimate of the crop was impossible, but it is believed that about 20,000 bales of 400 lbs. may be harvested.

Good results were obtained last year with varieties producing the harder bodied cottons and having a high ginning outturn, and it is expected that these varieties will be grown exclusively in future on the harder soils of medium fertility for which they have shown themselves to be particularly suitable.

South Africa.

The prospect of any marked increase in the output of cotton from the Union of South Africa is mainly dependent on the world market price. The rise in price was undoubtedly the principal factor in causing farmers to extend their acreage last year, and in spite of many difficulties encountered in the course of the season, such as damage by floods in the Orange River area, the crop was over 30 per cent. larger than in 1932-33.

Farmers throughout the Union were, however, mainly preoccupied last season with the danger threatened by the worst locust attack for many years, and their first concern was naturally to try to save their maize crops. The Department of Agriculture engaged in a vigorous campaign

with a view to helping farmers to deal with this menace, and on the whole a considerable degree of success was achieved in protecting the crops.

In the Low Veld area, in which is situated the Corporation's Experiment Station at Barberton, the season, though not altogether fulfilling its early promise, was probably better all round for farming than most of its predecessors. The crop experienced both bollworm and drought in an intensive degree, but in most parts, and especially in the Barberton valley, made an excellent recovery, giving good yields of high quality. Although locusts were present in large numbers, little damage was done to the cotton, mainly owing to the effectiveness of the methods used in dealing with hoppers, and the vigorous efforts of the growers to prevent swarms from settling.

At the Experiment Station the severe bollworm attack interfered a good deal with the work insofar as it rendered statistical comparision of the results unreliable or impossible. But the season provided a most satisfactory test of the power of recovery of the selections made in the past few seasons from the parent U.4 variety. The bollworm attack coincided with a period of drought : the greater part of the crop that had set was lost, all growth ceased and serious wilting set in. The situation was then relieved by rain, and the selections from U.4 recovered so remarkably that ultimately the crop was one of the best of recent years as regards both yield and grade. In fact, some exceptional yields of over 2,000 lbs. of seed cotton per acre were obtained on certain small areas, notably on old tobacco lands that had been manured in the previous season.

Work is being carried on assiduously on the principal insect pests, American bollworm and stainers, in the hope

that some practicable means of control may possibly be devised as a result. Two papers by members of the staff have appeared in the Bulletin of Entomological Research.

Investigations on possible rotation crops with cotton have been continued. The most suitable crops for the Barberton district have now been ascertained, and the variety trials that have been going on for a number of years have reached a stage at which they can be dropped for certain of the rotation crops of which the varieties that are best suited to local conditions may now be said to be known definitely.

As regards the current season, it is reported that a larger acreage has been planted in all areas. The planting conditions generally were fair, and the season had been satisfactory in the early months.

In the Barberton area, as a result of last season's experience when an average yield was obtained, in spite of very heavy bollworm infestation, the acreage under cotton has been increased by about 30 per cent. Writing at the end of February, Mr. Parnell was able to report that the season had up to that time been better than for some years. There had been little damage by pests, and unless some unforeseen calamity occurred, the prospects were definitely good.

A good season had also been experienced up-to-date at the Experiment Station, the chief adverse factor having been damage by aphis on some of the plots. The rotation crops had done particularly well, and record yields for the Station were expected.

In Northern Natal and the neighbouring districts the planting rains were exceptionally late, and the season altogether has been dry. Bollworm damage had not been severe up to

the beginning of March and the prospects were very fair; locusts had disappeared and were not expected to cause damage this season.

SWAZILAND.

Mention was made last year of the efforts that were being made to introduce cotton as a native crop. A promising start has been made, and in the season 1933-34 the number of growers was 31 as compared with 2 in the previous season, their crop amounting to about 10 bales of 400 lbs. each. If the crop can be successfully introduced, it will have considerable value in the development of native agriculture, apart from its cash value. At present the system is one of almost continuous cereal cropping, which has naturally decreased the fertility of the soil, and the yields obtained are low. The introduction of cotton is a step towards a system of crop rotation, which should assist in restoring soil fertility. Moreover, the natives are all cattle owners, and it is hoped to instruct them in the preparation and use of manure, which should also improve the soil. Native cotton demonstrators are being trained at the Corporation's Experiment Station: they are then posted to different sections of the native area, where they cultivate small plots for themselves, practising a simple rotation with simple equipment, and visiting and advising others who are interested in cotton and in general agricultural improvement.

In the present season there has been a considerable increase in the number of natives who have applied for cotton seed, and this in spite of the fact that severe locust invasions were threatened and the natives' principal concern was naturally for the security of their food crops. Much of the low and mid-veld areas are suited to cotton-growing, and its cultivation is well within the ability of the natives of the country, but expansion, especially in the early stages, cannot be expected to be rapid.

At the Experiment Station at Bremersdorp the rainfall was high and well distributed in the season 1933-34, and the conditions afforded an opportunity of testing the strains of the various crops under conditions of high rainfall compared with the drier seasons of the past few years. A feature of the variety trials of cotton was the success of the earlier strains, which under the conditions of recent seasons had not shown up so well.

The season 1934-35 began well, with good planting rains. In the early months the principal anxiety was the likelihood of severe locust attacks. But for this, and the late arrival of the rains in some districts, the increase in the total cotton acreage would have been greater. The season generally was satisfactory, though at the Bremersdorp Experiment Station bollworm attack was severe.

Southern Rhodesia.

In the quarterly report by the Executive Committee to the July meeting of Council, a summary was included of the account which had been given to the Committee of the Corporation's activities in Southern Rhodesia by Major Cameron, the Corporation's senior officer in the country, while on leave last summer.

A policy of caution has been consistently pursued, and propaganda in favour of cotton-growing avoided, with a view to ensuring that any extension of the crop may be based on sure foundations. The difficulty of the supply of suitable seed has been largely overcome, through the work of the station at Gatooma where the Corporation's plant breeders are engaged in continuous selection of the most promising strains, and a great deal of information has been collected as to bollworms and stainers, which are the principal insect pests causing

loss of crop, now that a variety resistant to jassid is being cultivated. Some increase in the area of cotton grown by European farmers is anticipated, even at present prices, while a slight increase in the price may well lead to a considerable expansion.

Meanwhile, as reported last year, a beginning is being made in encouraging cotton-growing by natives, and this may well grow to important dimensions. The Committee of Enquiry into the Economic Position of the Agricultural Industry of Southern Rhodesia, which reported last year, recommended that cotton-growing by natives should be encouraged, and that the Government should impress on them the importance and value of the crop. The majority of the Native Reserves are situated in areas of low altitude where there is a comparatively long growing season, and there is a native population of over a million. One difficulty is that some of the most promising districts are some distance from a railway, but road transport improvements are taking place, which it is hoped will keep pace with the production of native-grown cotton. The native population has hitherto been reluctant to grow any but food crops, but it is a gratifying sign that many of them are responding to the guidance of the Native Development Department and are adopting better farming practices, including a rotation of crops. As has been said above of Swaziland, the early stages of development must be slow, but it is believed that cotton-growing as a native industry has considerable possibilities.

The Station at Gatooma had the best season since it was established. Good yields were obtained from many selections, and nearly six tons of seed of two high-yielding strains were issued to growers. More would have been available had it not been for an unfortunate fire in the seed cotton dump before

ginning ; though much seed was destroyed, happily no strain was completely lost.

Much work was also done in recording the intensity of insect attack, and valuable data were collected concerning the habits of bollworms and stainers. One conclusion that is drawn from these is that early planting of cotton in relation to other crops is important as a measure for minimising loss from bollworm attack. The moths of American bollworm in particular are attracted to other crops besides cotton, and there is a certain stage in the life of each plant at which it is more attractive than at other stages. At Gatooma a systematic planting scheme has been adopted this season whereby other crops such as sunflowers, Kaffir corn, maize and groundnuts have been planted at times which will ensure their being at the attractive stage to the bollworm moths during the main period when cotton is setting its crop. It is hoped to test in this way the possibilities of the use of such trap crops by cotton growers.

In most of the country stainers are a factor which, while naturally lowering yield and quality, do not have a crippling effect on the crop. In the low veld, however, where host plants of the stainer abound, their effect is far more serious, and they may well be the factor which will decide whether certain areas can grow cotton or not. Where irrigation is available—in the Sabi Valley for example—growers are attempting to evade serious stainer damage by trying a range of different planting dates, and a programme of work in connection with stainer and bollworm recording has been mapped out for the present season by the Corporation's staff.

The 1935 season continued to be exceptionally wet up to the end of January, when the rains stopped suddenly. At that time the general effect on the cotton had been that the constant rains had made weeding and cultivating very

difficult, and growth had been retarded. By the middle of March the crop was badly in need of further rain. At that time bollworm attacks had not been bad; but it was still too early to be confident that they would not develop later in the season.

Northern Rhodesia.

As a crop for the areas in Northern Rhodesia cultivated by European farmers, cotton has so far proved a failure, owing to insect pests. The disastrous results of the efforts to grow it some ten years ago were brought about mainly by the damage caused by jassid. The introduction of the jassid-resistant variety U.4 bred at the Corporation's Station at Barberton enabled this pest to be defeated, but the loss from bollworm and stainer damage was still so severe as to lead to the crop being almost given up by Eurpoeans.

On the other hand, the natives of the country are absolutely without any cash crop, and from the point of view of the country's economic development, the introduction of some such crop as cotton is of first rate importance. Accordingly some small plots were laid down last season in native areas, the majority being at places situated at some distance from the nearest observed host plants of cotton stainers, the insects which have been responsible for so much of the damage to cotton in other parts of the country. The plots grew well and gave heavy yields of good quality cotton. The number of such plots has been increased this season.

These plots are being visited and supervised by the Corporation's officer at Mazabuka Station, where the cost of the experimental work on cotton is now being borne entirely by the Corporation. In all 19 plots of ½ acre each were established this season and placed under trained native assistants. Unfortunately, exceptionally late flying swarms of red locust did considerable damage in January: six of the plots were completely destroyed and others damaged to such an extent that little or no information as to yield will be

forthcoming. On the remaining plots continuous records of stainers are being made in addition to observations on any host plants in the vicinity. Results which will be of more than local value are hoped for from the accumulation of data concerning insect pests, since they will be collated with those obtained from other Stations in South Africa, Southern Rhodesia and Nyasaland. For this reason the Corporation have agreed to retain their officer at Mazabuka for the present year.

Anglo-Egyptian Sudan.

Season 1933-34.—The Director of Agriculture has kindly supplied the following details regarding the cotton crop of last season.

The table given below shows the final yield of cotton from the various districts of production for the season :—

	*Feddans.	Yield in †kantars.	Yield per feddan in kantars.	Calculated as bales of 400 lbs. lint.
SAKEL TYPE.				
Gezira.				
Sudan Plantations Syndicate Ltd.	155,896	360,230	2·31	88,757
Kassala Cotton Co. ...	18,976	49,730	2·61	12,184
Total	174,872	409,960	—	100,941
Tokar	37,700	22,620	0·60	5,285
Gash Delta (Kassala) ...	31,146	61,365	1·97	14,960
Pumping Schemes	5,447	17,406	3·20	4,246
Total Sakel ...	249,165	511,351	—	125,432
AMERICAN TYPE.				
Irrigated.				
Pumping Schemes ...	12,300	53,584	4·36	12,671
Rain Grown.				
Kordofan (Nuba Mountains)	47,000	76,487	1·63	17,104
Upper Nile	2,000	3,413	1·70	815
Mongalla	10,414	6,900	0·66	1,603
Total American ...	71,714	140,384	—	32,193

* 1 Feddan = 1·038 acres.
† 1 Kantar = 312 lbs. seed cotton.

As was reported in this report last year, the crop of the Gezira Irrigation Scheme was put in under favourable conditions and there was promise of a really good crop. Unfortunately exceptionally heavy local rains flooded considerable areas of promising young cotton, Blackarm made its appearance and abnormally late rain storms occurred which caused it to spread over large areas. Leaf curl also appeared, but was late in spreading and caused little damage. It appears that the extraction of the old cotton plants by the roots and the rigorous suppression of accidental ratoon plants afford an effective control of this disease in the Gezira.

The average yield per feddan was 2·34 kantars, which compares unfavourably with 3·60 kantars which is the average yield for the twenty-three seasons that the scheme has been in operation. There was a good proportion of high grade cotton. As noted last year, the behaviour of certain selected strains of cotton, which have shown themselves capable of withstanding adverse Gezira conditions, was very gratifying. The most promising of these, a direct selection of Gezira-grown Sakel which has been under observation for several years, was propagated on an area of 773 feddans in scattered blocks. It was severely attacked by Blackarm, but made a wonderful recovery and yielded 4·4 kantars per feddan.

Minor extensions to the canalised area, amounting to some 33,000 feddans, were carried out.

The 1934-35 crop made a good start and promises to give more than average yield, with the high grade cotton usually associated with early picking.

Of the flood crops grown on the deltas of the Baraka and the Gash at Tokar and Kassala in 1933-34, the latter was very successful and the yield and quality of the cotton were exceptionally high. Leaf curl was present, but spread little

and did no serious damage. The Tokar cotton industry suffered a severe setback, a promising early crop being severely attacked by leaf curl throughout the whole delta. The severity of the attack steadily increased, and a probable crop of 50,000 kantars was reduced to 22,620.

The flooded areas in 1934-35 season were similar to those of the previous season, though slightly smaller, and the crops are well established and promising. Approximately half the area in the Gash has been sown with the Sakel selection alluded to above with a view to propagating seed for use in the Gezira. Experimental plantings have also been made at Tokar, but it is by no means certain that it will prove a suitable strain for these flood lands owing to its maturing somewhat later than ordinary Sakel.

Extremely good progress can be recorded in the production of cotton of American type, particularly of rain-grown cotton in the South. The irrigated crop increased from 39,569 kantars to 53,584 kantars, while the rain-grown rose from 33,565 to 86,800 kantars.

In the areas in which cotton is grown under rainfall, progress has been greatest in the Nuba Mountains district where the experimental and demonstration farms have shown that high yields could be obtained by improved methods of cultivation. The coming season will see a further considerable increase in rain-grown cotton, and this industry may be considered to be well established and capable of great expansion.

Export figures for 1933 and 1934 are as follows :—

Raw cotton—ginned.	1933. Kantars.	1934. Kantars.
Egyptian	470,469	616,383
American	72,485	117,610
Scarto	4,952	3,427

Season 1934-35.—The following table gives the areas and some indication of the probable yields for the present season :—

	Area Feddans.	Anticipated yield in kantars.
SAKEL TYPE.		
GEZIRA.		
Sudan Plantations Syndicate Ltd.	156,040	
Kassala Cotton Co.	19,143	
Total	175,183	770,000
TOKAR	31,681	48,000
GASH DELTA (KASSALA)	28,210	65,000
PUMPING SCHEMES	6,343	23,100
Total Sakel... ...	241,417	906,100
AMERICAN TYPE.		
IRRIGATED.		
Pumping Schemes	12,421	33,666
RAIN GROWN.		
Kordofan (Nuba Mountains)	80,000	128,888
Upper Nile	4,500	4,761
Mongalla...	12,416	9,643
Total American	109,337	176,958

The Government have under consideration a re-organisation of the Agricultural Department and of the Agricultural Research Service. They also contemplate the removal of the Plant Breeding Section of the latter from Khartoum North to Wad Medani, thus centralising all the research work and saving a year in the breeding of strains suitable for Gezira conditions. It is also suggested that the Chief Plant Breeder, who is an officer of the Corporation, should discharge, in addition to his present duties, those of Assistant Director of Agricultural Research. In addition, it is desired to open a permanent plant breeding station in the Nuba Mountains

district for rain-grown cotton. The Government have asked the Corporation if they can help financially towards the cost of these developments, and the latter have offered a plant breeder to take charge of the Nuba Mountains station. Moreover, the Government are investigating fully the agricultural possibilities of Mongalla Province in the extreme south. This will require the services of an economic botanist, and may take two or three years, but if that area is shown to have promising potentialities, steps will be taken to develop its resources by the introduction and testing of varieties of cotton and of other crops.

The staff of the Research Service continue to concentrate their main effort on the problem of the nature of the factor that has depressed the yield of cotton in the Gezira in so many seasons. Among the lines of investigation that are being followed up are the effect of early rains on the normal cracking of the soil and its microbiological activity, the root development of the cotton plant under different soil conditions, and the fungi which have been found to attack the roots.

Kenya.

The energetic steps that have been taken by the Government to promote cotton-growing by natives resulted in a further substantial increase in the crop, which is of considerable importance locally, as it constitutes the staple cash crop of certain areas, particularly the Lake and Coast Provinces. Experimental work to ascertain the suitability of parts of the Central Province is also in progress and the results obtained so far are favourable.

A paper dealing with the cotton problems of the Colony prepared by the Department of Agriculture was discussed at the Corporation's Conference on Cotton Growing Problems

last year. In the opinion of the Department, the crop is not of sufficient size in any one area to justify the establishment and maintenance costs of seed selection stations, and in default of them, Kenya has to rely on the selection work that is being done in neighbouring territories where the crop reaches more important dimensions. It is probable that different types of cotton are required for the conditions of the Coastal area and the Lake Province respectively. In the course of the discussion that took place at the Conference, the suggestion was put forward that possibly a joint station for selection work on cotton might be set up for the coastal areas of both Kenya and Tanganyika where conditions were generally similar, while a station in Uganda might be able to deal with the problem of the Lake Province.

The crop for the season 1933-34 amounted to approximately 6,020 bales as compared with just over 4,000 bales in the previous season. This increase is specially noteworthy seeing that it was achieved despite adverse weather conditions on the Coast where drought reduced yields considerably.

Planting of the 1934-35 crop took place in May and June in Nyanza and in March-April on the Coast. According to reports, areas planted exceeded those of the previous season, but owing to excessive rains in the Coast Province during the growing period and a dry spell in Nyanza at the time of flowering, it is improbable that the output of cotton from this crop will be much in excess of that of 1933-34.

Uganda.

The crop of the season 1933-34 fell slightly short of the record figure of the previous season, but the total of nearly 286,000 bales of 400 lbs. is the second largest that the Protectorate has produced.

Reference was made in this Report last year to the action taken by the Government in declaring raw cotton zones within which all cotton grown must be ginned and baled. Subsequent legislation gave the Government power to fix minimum prices to be paid for cotton in the various zones, with a view to safeguarding the growers' interests in those areas in which buying associations were formed among the ginners. The Department of Agriculture's Report indicated that consideration would probably have to be given to the question of the redistribution of ginning capacity among the several zones, and that the next step should be the centralization of ginning in bigger units and a reduction in the number of individual ginneries. The desirability of action in this direction has been mentioned previously in the Corporation's reports, and it is hoped that effective steps may be taken to carry out the Department of Agriculture's proposals.

Some concern is felt at the spread of pink bollworm ; this pest has already been found both in the Northern Province and in Buganda, and its extension is believed to be due to the movement of seed cotton from one district to another. Had the present legislation restricting such movement been in force when pink bollworm was first reported, control would not have been the difficult problem that it has since become. The Department are fully alive to the risk to the crop if the area attacked reaches serious dimensions ; they have detailed an entomologist to devote his whole time to a study of the pest, and if his investigations lead to the conclusion that the resting stage of the larva under Uganda conditions is sufficiently long to enable the pest to carry over into the next succeeding crop, steps are to be taken to treat the seed by heat before planting.

The seed in the Province of Buganda has unfortunately been showing deterioration in the past few years, and the

establishment of a seed farm has been decided upon as one step in the organisation of an improved seed supply. In this the Corporation are co-operating with the Government. A suitable site has been found on which about 350 acres will be under cultivation, about 100 acres each year being cotton. The Government are contributing the land, the house for the farm manager, and its upkeep, while the Corporation are providing funds to meet the necessary capital charges, such as the erection of stores, labour lines, a gin and press, and are also supplying rather more than half the estimated running costs for the first five years.

The cotton-breeding work carried out at Bukalasa for the Western area, and at Serere for the Eastern Province, has produced some useful results. In the Western areas the main problems are the production of strains with uniform lint, improvement in staple length and in plant habit, and resistance to the diseases blackarm and wilt. Some promising types have been isolated from local cotton. In the Eastern Province the Department are trying to obtain by selection a type more resistant to blackarm and giving higher yields; it is possible that this may result from selection in U.4 cotton from Barberton. Already a selection has been made which gives far better yields than the local cottons, and it is also much more resistant to blackarm and jassid. Unfortunately, the quality of its lint is not yet up to requirements, and the difficulty that it is feared may be encountered is that further selection for improvement in quality may be accompanied by deterioration in agricultural properties.

It has been previously reported that, as a means of enabling native cultivators to identify some of the principal pests that attack cotton, the Government decided to circulate both small and large coloured plates depicting the two which cause most damage, mainly for use in schools. The Corporation

acceded to a request to contribute the greater part of the cost of preparing and reproducing these plates and posters, which have been executed under the supervision of the Imperial Institute of Entomology.

In the season 1934-35 dry weather conditions hindered the sowing of the crop. In spite of the difficult planting season, occasioned by long spells of dry conditions in most areas, the total acreage was probably about the same as that of the two previous seasons.

Heavy rains in August were followed by exceptionally dry weather in September, October and November. The excessive August rains caused some damage, and the drought following was favourable to the increase in numbers of sucking insects, and of these, Lygus, caused considerable damage in most areas. Apart from Lygus, the crop was comparatively free from insect pests and disease.

Good rains fell in December and crop prospects in some areas improved slightly, except in districts in which cloudy weather and sub-normal temperatures were experienced. January was dry, and the crop in the Eastern Province suffered a slight set-back ; February and March were very wet and the crop condition generally was consequently below average. It was expected in March that the total production would not exceed 220,000 bales of 400 lbs. each net.

Tanganyika Territory.

As a means of alleviating the economic depression which has accompanied the fall in the price of commodities, the Government have carried on a vigorous campaign for increased production of crops grown by natives.

It will be recollected that it was reported last year that the Corporation were giving consideration to proposals submitted by the Director of Agriculture for important

developments in cotton production, for which the Corporation were asked to provide the necessary funds. These proposals were approved, and a grant to cover the capital expenditure involved and recurrent expenditure for a period of five years has been made to the Department of Agriculture. Mr. May, Assistant Secretary to the Corporation, has also paid a visit to Tanganyika, and was able to see something of the new developments.

The Corporation's assistance is being chiefly used to enable expansion to take place in four districts :—Mpanganya, in the Valley of the Rufiji ; Morogoro, on the Central Railway, the headquarters of the Agricultural Department ; Lubaga, about 100 miles south of Lake Victoria ; and Ukiriguru, which is near Mwanza on Lake Victoria.

At Mpanganya the Cotton Experiment Station has been re-opened and placed in charge of an experienced Agricultural Officer. It should be fully equipped within the first six months of this year. The natives of this district left in considerable numbers after the disastrous floods in 1930, but they are now returning, and last season the district produced 800 bales of cotton. It is believed that this output could easily be doubled with the present population.

At Morogoro the work of the Cotton Experiment Station is to be extended, and an area added for seed multiplication. Approximately 150 acres have been cleared for planting this year and a small ginnery has been erected.

At Lubaga the scope of the work of the Experiment Station, where the variety known as U.4 obtained from the Corporation's Station at Barberton, South Africa, is being grown, has been extended ; and at Ukiriguru also the Station is being further equipped and a seed multiplication area added, of which 120 acres have come under cultivation this year.

Moreover, at each of the three last-named places the Corporation's assistance will be used towards developing a most interesting scheme evolved by the Agricultural Department for native holdings on which cotton will be grown in a scheme of mixed farming. Each family will be given security of tenure on a holding of 20 acres. Of these, 10 acres will be reserved for cattle grazing, and the remainder for the dwelling site and land for the cultivation of cotton and rotation crops. A covered cattle pen will be built, and the natives will be given instructions in the preparation and use of farmyard manure. The scheme is generally similar to that of the Agricultural Department, Nigeria, in which the Corporation have tentatively agreed to co-operate.

The Mwanza area or Lake Province has always been the most important cotton area in Tanganyika. The organization of its seed supply is therefore a matter of importance, and with the help that is now being given by the Corporation it is hoped to put this on a satisfactory basis. The selection of the best strains will be carried out at the Experiment Station at Ukiriguru ; these will then be multiplied in the special area that has been secured for the purpose at Uzinza, which is just across the arm of Lake Victoria known as Smith Sound. The seed from this area will be bulked on Ukerewe, an island in the Lake, which makes an admirable isolated area where admixture of strains can be prevented. The bulked seed will then be distributed in the following season throughout the Lake Province.

The Director of Agriculture has kindly supplied a note on the 1934 season and the prospects for 1935, from which the following is an extract.

A large increase in both native and non-native plantings occurred in 1934, and a record production was attained. The export of cotton lint amounted to 31,612 bales of 400 lbs. each,

as against the previous highest figure of 28,420 bales in 1933. There will be an appreciable carry-over into 1935, and the actual production of lint for the 1934 season is estimated at 38,000 bales. Of this, 26,000 bales were produced by natives in the Lake Province, an increase of 60 per cent. over the previous season ; this was achieved despite a severe drought which very seriously affected the yields of grain crops. Elsewhere in the Territory, and especially east of the Rift Wall, including the Eastern, Southern and Tanga Provinces, the cotton crop was almost a failure due to the adverse rainfall conditions : the rains were sparse over the planting season and then fell heavily over the normally dry months of May and August with disastrous results to the flowering cotton crop.

The re-organization of marketing, especially the minimum price rule, has done much to make cotton more popular with native cultivators.

Non-native production amounted to 4,540 bales, mainly from the Eastern Province. Europeans are developing this crop to an increasing extent in the Northern Province, especially under irrigation, and generally non-native effort is showing considerable advance.

The Director of Agriculture, writing in February, said that it was impossible then to give a reliable forecast of the prospects for the 1935 crop, as planting only began that month east of the Rift Wall. Good rains had started, however, and after two successive years of poor rainfall, cotton planters were looking forward with some confidence to a good year. In the Lake Province, planting starts earlier, and it was anticipated that the area under cotton for 1935 would be at least as large as that for 1934, and as a special effort is being made in the areas of the Western Province adjoining, there should be a record out-turn from the North-West circle.

Nyasaland.

Last year it was mentioned that the removal of the Corporation's chief experiment station to Domira Bay had been attended by satisfactory results. In the season 1933–34 the full 150 acres were under cultivation for the first time, and the yields from the latest fields to be cleared indicate that they are likely to prove to be some of the best land on the Station.

The strains selected for multiplication as a result of the breeding work were grown on an estate near the Station in 1933-34, and the resulting seed cotton was sent to Port Herald and there ginned separately. The seed is being grown in the current season on an isolated area in the Port Herald district, and next year sufficient seed should be available for the whole country. Thus the Domira Bay Station will be the source of all seed grown in Nyasaland, and an organization equivalent to that just described will allow of fresh seed being generally distributed when necessary in three years from the time that it first leaves the Station.

The Corporation's administrative headquarters in Nyasaland are about to be moved from Zomba to Lilongwe, which is not only more centrally situated for the cotton areas as a whole, but is also within easy reach of the Domira Bay Station, of railhead, and of the base port of the Lake steamer service. Lilongwe is the headquarters of the Government administration in the Northern Province, and is situated in Central Angoniland, which is the best agricultural area at the higher elevations in Nyasaland.

While the Domira Bay Station will serve the whole of the cotton-growing area of Nyasaland below an elevation of 3,000 feet, a small sub-station for the potential cotton-growing districts above that height is to be laid out at Lilongwe.

Selections from the Corporation's Station at Gatooma, Southern Rhodesia, are being tried there this season, as it is thought that the climate at Lilongwe resembles that of Gatooma more than it does that of any of the present cotton areas of Nyasaland.

Work on insect pest control, particularly on stainers, is being carried out at Domira Bay, in co-operation with the Corporation's Station at Barberton.

The improvement in yield from U.4 cotton, coupled with an improvement in price and the energetic measures that have been taken by the Government of Nyasaland to push native cotton-growing, have led to a considerable expansion in the Lake shore area, both on Crown land and by tenants under European supervision.

The latest reports show that the crop for 1933-34 has surpassed that of 1928-29, which was the record year for the Protectorate, and an output of over 10,000 bales has been reached.

For the current season 1,451 tons of seed have been distributed to natives ; from this quantity a very substantial increase might have been expected, but the season has been disappointing, especially in some districts, owing to drought.

Europeans are taking a renewed interest in cotton cultivation, rather in the direction of encouraging their native tenants to grow the crop than in cultivating it for themselves with paid labour. A further 1,000 bales may be produced by these means this season.

As last year, the extent of the damage caused by locusts may well be a deciding factor in determining the size of the crop. By mid-February the damage had fortunately not been serious.

Mr. Ducker, the Corporation's senior officer in Nyasaland, has recently visited Tanganyika, to discuss with the Director of Agriculture the cotton problems common to the two territories. It is believed that the Corporation's staff in Nyasaland may possibly be able to assist the Tanganyika Department of Agriculture in the development of cotton-growing in those parts of the territory that adjoin Nyasaland at the North end of the Lake. Moreover, in view of the fact that the U.4 type of cotton, which is the only variety now grown in Nyasaland, has given promising results in parts of Tanganyika, the potentialities of Domira Bay as a breeding station may be utilised for raising types of seed for certain districts in Tanganyika also.

Nigeria.

When last year's Report was written, the forecast of the season's crop was that it would be approximately the same as in the previous year. The demand for seed had been keen, but the weather conditions in the North were unfavourable during the greater part of the growing period, with the result that the yield per acre was lower than usual. As a fact, however, the total crop was heavier than was anticipated at that time, over 28,000 bales being produced, as compared with 24,000 bales in the previous season.

Largely in consequence of a vigorous campaign on the part of the Agricultural Department, production for 1934-35 is expected to show a very marked increase. The demand for seed in the Northern Provinces was the largest on record, and in the earlier part of the season, at all events, the climatic conditions were favourable. In anticipation of a large crop, arrangements were made for opening many more markets than last year, especially in the Kano Province. The re-organisation of the market system in the Northern Provinces has been under discussion, and proposed new regulations are

under consideration by the Government. The essential feature of the new scheme is the formation of an Advisory Committee, on which the Residents of the Provinces concerned will sit, together with representatives of the buyers and of the British Cotton Growing Association.

The Corporation's immediate interests in Nigeria lie in the Seed Farm which is maintained by them at Daudawa in the Northern Provinces. An outline was given last year of the proposals that had been put forward by the Government for extending the functions of the seed farm, with a view to devoting part of the cleared land to a tenant farmers' scheme, which would include the use by the tenant farmers of cattle for draft and for manuring the land. Before going further with the proposal, it was thought advisable by the Government to carry out first a tsetse survey at Daudawa, in order that the question might be settled whether keeping cattle was feasible at Daudawa on a fairly large scale. The result of the survey was satisfactory, and the Executive Committee accordingly investigated the proposals in detail. They felt some hesitation in accepting responsibility for the management of the scheme, owing to the fact that the duties which it would throw on their officers in the matter of control of the tenants, in their farming methods, in the grading and sale of their crops, and in ensuring that they carried out their allotted work on the Corporation's part of the farm, by means of which it was suggested that they should pay off the capital advances that the Corporation would make to them, would, in the view of the Executive Committee, be more satisfactorily performed by officers of the Agricultural Department than by those of the Corporation. In view, however, of the express wish of the Nigerian Government that the Corporation should give the scheme a trial, an experiment on quite a small scale, with not more than two tenant farmers for the first year,

is to be carried out. After one or two seasons it should be possible to gauge the chances of success of a larger scheme from the prosperity or otherwise of the first tenants, and it would then become a matter for further consideration whether effect should be given to the proposals in full, either under the direct control of the Government or through the Corporation.

In Nigeria and in other parts of Africa the extension of mixed farming is generally regarded as being of great importance in native agricultural development, and the result of the experiment that is about to be tried at Daudawa will be awaited by the Corporation with interest.

Last season at Daudawa cotton was grown on over two-thirds of the total cultivated area. A portion of it was grown through cereals, following the native practice, with the rather unexpected result that such cotton in some cases gave a better yield than did cotton grown as a crop by itself. A complete explanation of this result is not possible, for naturally the quality of the land varied considerably in different parts of the farm ; but it is suggested that during the earlier parts of the year, when the weather was unusually wet, the cereals may have had a protective effect on the cotton, and when they had been harvested, the cotton was able to go forward to greater advantage.

Members of the staff of the Agricultural Department contributed an interesting paper on the cotton-breeding problems of Northern Nigeria to the Conference held by the Corporation in July last. The paper brought out the fact that growing millet on the same land as cotton was profitable to the native under the conditions experienced in the Northern Provinces, owing to the fact that he could thus obtain a very valuable food crop in addition to his cotton.

The Agricultural Department are seeking to improve the quality of Ishan cotton grown further South, and the Corporation are endeavouring to assist in this direction by means of work that is being carried out at the Station in St. Vincent with the object of seeing whether the lint length and fineness of Ishan can be improved by crossing with Sea Island and subsequently extracting long linted strains after repeated back-crossing. Several selections of the first back-cross to Ishan have been sent to Nigeria for further trial.

As regards the season 1934-35, the Director of Agriculture wrote at the end of February that the purchases of American-type cotton in the Northern Provinces should approximate to 48,000—49,000 bales, while the crops produced in the middle belt and the Southern Provinces should yield a further 7,000 to 8,000 bales, making a total for the country of roughly 55,000 bales.

The growing season, though favourable, was not so good as in either 1925-26 or 1929-30 when big crops were obtained, and the record output this season is undoubtedly due to increased planting. The trend of prices will doubtless decide whether this increased output will be maintained.

Gold Coast.

In Togoland, in spite of heavy rains and strong winds, the 1933-34 season showed an increase in the cotton available for export, although the yields on Kpeve Experimental Station were practically nil. The export has declined over the last five years, owing to the low prices of cotton, an improved market for yams and further development of cocoa.

The Government has made definite attempts to stimulate cotton in the Yam country by means of Co-operative Societies ;

and this year, although the numbers of the Societies were fewer, more cotton has been planted, all of the Ishan type. Farmers are now satisfied as to the superiority of this type over the local variety, and maintain their own seed supplies.

In the current season the cotton is reported to be growing satisfactorily, and a better crop is expected than in the last few previous seasons.

In the Northern Territories prices remained too low to make cotton-growing for export profitable, but the improved strain produced by selection by the Agricultural Department was maintained on a small scale.

West Indies.

Last year the formation was recorded of an Association of cotton-growers in the West Indies under the title of the West Indian Sea Island Cotton Association, which decided to set up an Advisory Committee in this country on which the Corporation is represented.

The Association held its second Annual Meeting in Montserrat in November last. Throughout the year particular attention has been devoted to the adjustment of production to demand. Although, unfortunately, restriction of production is still necessary, the Association considered that the steady improvement in demand, as shown by the statistical position regarding sales and stocks, justified a small increase in the amount of Sea Island lint permitted to be exported in 1935 up to a maximum of 1,150,000 lbs.

The Advisory Committee met for the first time in March 1934, when Mr. H. Astley-Bell was elected Chairman: the first meeting was held at the Colonial Office, and the subsequent meetings at the offices of the Corporation. In order to secure

the closest co-operation between the work of the Association and that of the Advisory Committee, the President and other members of the Association who were in England during the summer attended several meetings of the Advisory Committee. In general, the Committee has so far been able to undertake only preliminary work, but in the course of it several definitely constructive schemes have been set in motion. Research work has been arranged, and is being carried out, with a view to extending the possible use of Sea Island cotton ; steps are being taken towards protecting the quality and description of goods manufactured from Sea Island cotton, and efforts have been made to increase consumption by means of direct contact with the manufacturers. It is believed that the activities of the Committee have been responsible in no small degree for the improvement in the position of the industry that has been recorded during the past year.

The work that is being carried out at the Cotton Station in St. Vincent not only includes experiments that are of direct value to the local cotton-growing industry, but comprises also experiments that make it a valuable sub-station for the Genetics Department of the Research Station, Trinidad.

The work on the local strain of superfine Sea Island has included an attempt to produce a strain by selection that will give higher yields. Unfortunately, the seed of the commercial pure strain became contaminated with other seed in the storage shed : the result was shown in the appearance of off-types in the field in which the strain was being multiplied, and it was necessary to find an alternative source of supply of seed for the planting of 1935. To prevent a recurrence of such an incident a special seed store is being built for the pure seed for the multiplication area.

The selected Marie Galante cotton grown in Carriacou last year on a multiplication plot of 100 acres produced an

excellent crop. The crop is estimated at 25 bales which will be sent home, and the spinners to whom it may be sold will be asked to submit it to a thorough commercial test and to give a report on its spinning qualities. It is hoped that it may be possible to plant some 2,900 acres with the best of the selections for the season 1935-36. It is suggested that the name "Antilles Cotton" be given to this new variety, and its possible establishment as a commercial cotton is attracting much interest among the cotton-growers of the small dry Islands. Final commercial tests and reports are being awaited before further definite recommendations for extending the area of this cotton can be made.

Other work carried out at the Station as a part of the programme of the Genetics Department of the Research Station, Trinidad, is referred to in the section of this Report dealing with Research.

The following note on the last cotton season has kindly been supplied by the courtesy of the Commissioner of Agriculture.

In some islands the planting season is in August–September and in others in March. In the former the season runs from one calendar year to another (1933-34), whereas in the latter it is completed within one calendar year (1934). The climatic conditions of the two distinct periods and their influence on the crop may therefore be widely different. In these notes the figures relating to acreage and production cover both periods.

The area planted in Sea Island cotton amounted to 5,582 acres, being slightly less than the maximum area recommended by the West Indian Sea Island Cotton Association for the season. The majority of the Islands planted far less than their respective allocations but in Montserrat, which accounts for approximately three-fifths of the total area, conditions favoured extensive planting.

For the Islands which plant in August–September, weather conditions in 1933 were not generally favourable for a good crop, rainfall being excessive in the growing season. In Montserrat, where planting and picking take place in the same year, an abnormally dry wet season favoured the production of a very heavy yield ; in St. Kitts drought conditions were too persistent to permit satisfactory growth.

There was a remarkably low infestation of insect pests and diseases throughout all the Islands. Cotton stainers were, however, fairly prevalent in Nevis.

The total production of Sea Island cotton lint amounted to 1,113,516 lbs., equivalent to 2,783 bales of 400 lbs., and of Marie Galante cotton lint to 334,496 lbs., equivalent to 835 bales of 400 lbs.

St. Vincent.—The area planted (viz. 1,216 acres) was nearly double that of the previous year. A low yield was, however, obtained owing to the abnormally wet weather of the last three months of 1933. Cultivation was of a poor standard and manuring inadequate owing to unremunerative prices. Little damage was caused by pests or diseases.

Barbados.—The low price prevailing continued to render cotton cultivation unattractive. Only a small acreage was planted, and the unusually low yield obtained was due to the fact that a large proportion of the area planted was destroyed before harvest season owing to very unfavourable weather conditions.

Montserrat.—Unfavourable weather during the early part of the season had an adverse effect on the crop. But very favourable conditions during the normal period of the wet season resulted in an exceptionally heavy yield and an almost complete absence of pests. A record crop of 277 lbs. lint per acre was produced.

Antigua.—A small acreage was planted. Favourable conditions produced a good yield.

Nevis.—The acreage was increased to about 600 acres and a very satisfactory season was experienced. Large numbers of stainers appeared towards the end of the season.

St. Kitts.—Very dry conditions prevailed throughout the season, causing stunted plants in several districts. The general yield was, however, fairly good.

Anguilla.—The season's growth and yield were generally satisfactory and an increased area was planted.

Carriacou.—The area of the selected Marie Galante cotton was extended to 100 acres from which lint in sufficient quantity to make adequate commercial tests has been produced. Several strains of cotton are included in this area from which a final selection will be made before the replacement scheme contemplated by Government is put into effect. Small experimental plots of this cotton have been grown in Tortola and Anguilla with promising results.

PRODUCTION AND EXPORT FIGURES FOR COTTON IN 1933–34.

Island.	Acres.	Production.			Export.		Year.
		Lbs.	Bales of 400 lbs.	Lbs. per acre.	Lbs.	Bales of 400 lbs.	
SEA ISLAND.							
St. Vincent ...	1,216	99,750	249	82	204,519	511	1933–34
Barbados ...	62	1,555	4	25	1,670	4	1933–34
Montserrat ...	3,106	860,924*	2,152	277	751,921‖	1,880	1934
Antigua ...	65	9,600†	24	148	9,300§	23	1933–34
Nevis ...	600	47,677	119	80	50,197	125	1933–34
St. Kitts ...	253	59,129‡	148	234	82,268	206	1934
Anguilla ...	280	34.881¶	87	124	34,445	86	1933–34
MARIE GALANTE.							
Grenada ...	—	287,840	719	—	287,840	719	1933–34
St. Vincent ...	719	46,656	116	65	53,907	134	1933–34

* Includes 43,254 lb. or 108 bales stains.
† ,, 300 lb. ,, ¾ ,, ,,
‡ ,, 8,053 lb. ,, 20 ,, ,,
¶ ,, 4,906 lb. ,, 12 ,, ,,
‖ Does not include 24,190 lb. or 60 bales stains.
§ ,, ,, ,, 300 lb. ,, ¾ ,, ,,

ESTIMATED ACREAGE AND CROP FOR 1935 AND 1934–35.

Island.	Acres.	Production.			Year.
		Lbs.	Bales of 400 lbs.	Lbs. per acre.	
SEA ISLAND.					
St. Vincent	1,449	144,900	362	100	1934–35
Barbados	468	46,800	117	100	1934–35
Montserrat	3,500–4,000	700,000	1,750	200	1935
Antigua...	200	18,000	45	90	1934–35
Nevis	1,000	90,000	225	90	1934–35
St. Kitts	300	60,000	150	200	1935
Anguilla	300	25,000	62	83	1934–35
MARIE GALANTE.					
Grenada	5,510	280,000	700	51	1934–35
St. Vincent	652	42,000	105	64	1934–35

Cyprus.

Cotton is grown on both irrigated and non-irrigated land, and there is an annual variation in the proportion of the irrigated to the non-irrigated crop, which is determined largely by the quantity and distribution of the previous winter's rainfall. If this is sufficient to allow flood water to be distributed over fields suited for cotton, much of the irrigated land is used for other crops. In a recent article in the *Empire Cotton Growing Review*, the Assistant Director of Agriculture wrote that, recently, active interest had been taken in the development of supplies of irrigation water by Government and by private enterprise.

Production last year showed an increase over that of both 1932 and 1933 which suffered from drought. In 1934 also the crop was less than it should have been owing to shortage of spring rains, but it was more than double that of the previous year.

Ceylon.

The work of the Department of Agriculture in encouraging cotton as one crop in a rotation in the dry zones received a setback from the closing of the local spinning and weaving mills. Cotton was beginning to be recognised by the growers as a crop for which there was an assured market, but the situation with which the Department was faced would have been difficult to surmount, as the industry is too small in the dry zones to warrant the installation of gins and presses locally. Fortunately the mills, who were the sole buyers of all locally-grown cotton, have reopened, and this fact, coupled with the assistance given to the peasant growers by the Department of Agriculture in distributing seed free of charge, buying the cotton on their behalf and transporting it to the mills, has aroused renewed interest in the crop. The principal

variety grown is Cambodia, and about 1,200 cwt. of seed cotton (approximately 100 bales of lint of 400 lbs.) were produced in the season 1933-34.

Fiji.

It was reported last year that the area under cotton in 1933-34 had been restricted by Government to 700 acres, and that bad weather had prevented more than 350 of these from being planted by January. The weather continued unfavourable and showers lasted intermittently until June, with the result that late-planted cotton failed altogether. Finally, less than 130 acres were harvested. In consequence of this experience, seed was made available for planting early in November this season. It is believed that by putting the planting date earlier the crop will escape the worst of the insect attack, and, moreover, it was hoped that in a reasonably favourable season growers would be able to sow their cotton well before rice-planting operations begin.

Spinning tests were again carried out by the courtesy of the Peel Mills, Bolton, on the New Guinea × Sea Island back-cross, which the Corporation's Officer, Mr. Anson, is seeking to establish in Fiji in place of Sea Island, in the hope of providing a type which will command a wider market. These tests showed that the type still needed to be improved, but this Mr. Anson believes can be effected by means of single-plant selection. Samples are again being forwarded for test, while the better of the two back-crosses is being grown again in the present season.

Although it is unlikely that Indians will be prepared to grow other crops than sugar while the price of the latter remains at its present level, the sugar industry cannot absorb all the Indian community, and for Indians as well as for Fijians, the Government may find cotton a desirable alternative crop.

The Agricultural Instruction Scheme for Fijians, for which Mr. Anson has been largely responsible, has made fairly satisfactory progress; the people are enthusiastic, and good land is available. Its success is dependent mainly on a remunerative price being obtainable for a crop in quantity.

The 1934-35 season opened with three months for which the total rainfall was more than 10 inches below the average, with the result that little cotton has been planted. Sufficient seed was issued to plant 400-500 acres of Sea Island in the Lautoka and 400 acres of back-cross in the Sigatoka districts. However, by the end of January only 160 acres had been put under Sea Island and 60 acres under the back-cross. When the rains did set in eventually, in the second week in January, the peasants naturally gave rice preference, owing to its being a food crop.

At the request of the Government, the Corporation extended the period for which they agreed to retain the services of Mr. Anson in Fiji, half his salary being paid by the Government. The Government asked that this arrangement should continue until the new Director of Agriculture, who arrived in Fiji last year, should have had time to take stock of the position. Mr. Anson's engagement was accordingly extended, but he is now about to be transferred to the Sudan.

Research.

Research Station, Trinidad.

Genetics Department.—The following account of the work of the Genetics Department is based on a note kindly supplied by Dr. Harland:—

During the past year the following papers from the Department of Genetics have either been published or have been accepted for publication:—

(1) The Genetics of Cotton. Part XI. Further experiments on the Inheritance of Chlorophyll Deficiency in New World Cottons, S. C. Harland

(published). (2) The Genetics of Cotton. Part XII. Homologous genes for Anthocyanin Pigmentation in New and Old World Cottons, S. C. Harland (in the press). (3) The Genetics of Cotton. Part XIII. A third series of experiments with the Crinkled Dwarf mutant of G. *Barbadense* L. The cross *barbadense* crinkled × *hirsutum* crinkled. S. C. Harland. (4) The Genetics of Cotton. Part XIV. The inheritance of brown lint in New World cottons. S. C. Harland. (5) Cytological Studies in Cotton. Part III. A hybrid between *Gossypium Davidsonii* Kell. and *G. Sturtii* F.v.M. A. Skovsted (in the press). (6) Some New Interspecific Hybrids in the genus *Gossypium* L. A. Skovsted (in the press). (7) Chromosome Numbers in the *Malvaceae*. I. A. Skovsted (in the press).

In addition, three papers were also presented to the Conference of Cotton Workers held in July, 1934, and were printed in the Report of the Conference.

Investigations are being continued along the following lines :—Work on the cytology and genetics of interspecific crosses in *Gossypium* is being continued, and also the cytology of related species of *Malvaceae*.

Studies of the behaviour of the Crinkled mutant of Sea Island cotton in interspecific crosses have been continued, and it has been found that there are several different normal allelomorphs of Crinkled, each species being characterised by special allelomorphs. The normal allelomorphs can be distinguished by their dominance reactions to various types of extracted crinkled. Sea Island contains a strong normal Cr^B capable of producing dominance over almost all combinations of modifiers, while Upland apparently contains two different normal genes, neither of which can produce complete dominance on a Sea Island genotypical background. This work is of great importance in connection with a more complete understanding of the phenomenon of dominance.

It has been found that certain varieties of Sea Island cotton occasionally produce seeds containing two embryos. One of these is a normal and the other a haploid type possessing only half the normal number of chromosomes. These haploids are of great use in plant-breeding work, since

they provide a stable homozygous background for use in back-crossing work. The possibility of obtaining haploids in large numbers possessing great diversity in physiological and morphological characters opens up a new chapter in the methodology of cotton breeding.

The numerous combinations of characters of Asiatic and New World cottons resulting from the partially fertile New World × Asiatic hybrid previously reported are now seen to be of considerable economic importance. One strain combines the best features of South African U.4 with the earliest maturity yet recorded—maturing all its bolls in $3\frac{1}{2}$ months from sowing. Its importance for India cannot be over-estimated.

A new method of studying the inheritance of quantitative characters has been devised and the mode of inheritance of lint length and hair weight per cm. is being followed in a Sea Island × Egyptian cross.

Studies of linkage relationships are being steadily proceeded with and the first two definite cases of linkage in New World cottons have been recorded. The two pairs of linked characters are respectively Crinkled Dwarf with Green lint, and Red plant-body with Cluster habit.

Dr. Skovsted's Cytological work has been confined to the *Gossypium* hybrids with 39 chromosomes. The results obtained show that the chromosome conjugation is very similar in hybrids between New World cottons and wild species from the New World, but entirely different from those in hybrids between Asiatic and New World cottons, while the hybrids with *G. Sturtii* form a third and entirely separate group.

Hybridisation experiments have been continued and some useful positive results recorded. The programme of work for

the current year includes continuation of last year's work, together with the cytological study of the species hybrids with 26 and 52 chromosomes respectively, and of haploids in New World cottons, and other experiments.

Dr. Harland was given permission to make a tour in Colombia, where he hoped to find several interesting types of cotton that would be valuable for his work.

Physiological Department.—Dr. Mason has been good enough to supply the following account of the work that is being carried out by himself and Dr. Phillis :—

During the year papers have been prepared on the following subjects :—

> (1) An Activated Diffusion Theory of Phloem Transport. (2) The Aeration Factor in Transport. (3) Movement of Carbohydrate and of Nitrogen in opposite directions through the Phloem. (4) Bound Water.

The first paper will be read at the International Botanical Congress at Amsterdam in September of this year, and the others will be submitted shortly for publication in the Annals of Botany.

We have demonstrated that transport in the phloem is dependent upon an adequate supply of oxygen. The investigations on transport, which have been carried on since the inception of the Station, have now enabled us to formulate a theory of the mechanism of transport. The theory, briefly, is that the energy liberated as a result of respiration in the sieve-tubes is utilised in reducing the resistance of the protoplasm to movement through it, so that particles diffuse through it several thousand times faster than they would move if the sieve-tubes contained only water.

Two new methods of assessing the manurial requirements of the soil by means of chemical analysis of the plant are being investigated. The first method is based on the assumption that under conditions of plant-food starvation, a higher proportion of the food absorbed by the roots will be utilised in the plant than when the supply is abundant. The methods elaborated for the estimation of bound water, to which reference was made in last year's Report, enable us to estimate how much of the manurial elements contained in the plant is utilised for growth and how much remains inert in the sap. The second method is based on the observation that when the leaf area is reduced, there is an increase in the photo-synthetic efficiency of the remaining leaves, and that the extent of this increase would appear to depend on the mineral supply to the roots.

The distribution of food materials in the cell continues to receive attention. Evidence obtained so far suggests that there may be regional differences in the concentration of the various solutes between cytoplasm and vacuole. Work on transport is being continued along the following lines :— (i) mechanism of dye transport through the phloem, (ii) the effect of temperature on transport.

It is hoped in the course of the present year to carry out a series of experiments on vernalisation of cotton seed, a treatment of the seed before sowing whereby maturity of the resulting plants is accelerated in certain cases.

Extension of leave has been granted to Dr. Mason in order that he may attend the International Botanical Congress to be held at Amsterdam in September next.

Experiment Stations.—This year an experiment has been tried in connection with the publication of the collected

Reports received from the Experiment Stations. Ever since this volume was first published, the difficulty which has presented itself is how the results of the work of the Stations can best be set out, bearing in mind that they should not only be directly serviceable to those engaged in similar work in other places, but should also convey a clear idea of the objects and results of the work to those who can have little technical knowledge of the kind of work described, but to whom the results are of sufficient importance for them to have financed it, and who are therefore entitled to have those results put before them in a form in which they can understand them. The problem was discussed at the Conference on Cotton-Growing Problems held last year, and it was decided to issue two volumes, the first consisting of a general review of the work of all the Stations, compiled from summaries which the several Stations were asked to supply in non-technical language. The second volume consists of progress reports on the year's work at the Stations, which are intended principally for the use of co-workers elsewhere. The difficulty encountered in connection with reports such as these is common to all applied research work, and it is hoped that the expedient that has been adopted this year may afford at all events a partial solution.

The principal lines of work that have been followed up consist as before of (i) plant breeding with a view to improving the quality of the agricultural properties of cotton and various rotation crops ; (ii) work on the improvement of agricultural practice in different parts of the Empire, and (iii) the study of pests and diseases.

The fact that considerable progress has been made in several directions in connection with plant breeding has enabled some of the Stations in areas where insect pests

constitute a serious menace to devote an increasing proportion of their time to their study, in the hope that some means of control may ultimately be evolved.

Home Universities and Institutions. — Cambridge University.—The second Conference on Cotton-Growing Problems, arranged by the Corporation in July, 1934, was much appreciated by all concerned, including the School of Agriculture. It gave an outstandingly interesting opportunity for meetings with men engaged in most of the cotton-producing territories of the Empire. Among them was a considerable number who had passed through the School, some as Corporation Scholars. Apart from the pleasure and many general advantages thus accruing, the Conference, in two of the sections which comprised its discussions, dealt with matters which are important in the research and teaching at Cambridge —genetics and field experiments.

The opening paper on genetical questions (by Mr. A. E. Watkins, Cambridge) discussed the practical application of genetic science to plant breeding. In this question the Corporation, with centres in Africa where important breeding work is in progress and the Research Station in Trinidad for more purely scientific study, is vitally interested. Similarly the School of Agriculture, in its Plant-Breeding Institute, embraces practical breeding and genetic science. The discussion disclosed the views that (i) actual plant breeding is still far from possessing the methods and precision of a science ; and (ii) in the training of a plant breeder, practice and a thorough grounding in the sciences must be united. Papers were given by Dr. S. C. Harland and Dr. A. Skovsted (Trinidad) on cross breeding between parent types of cotton having different numbers of chromosomes (e.g. American types have 26, Indian have 13). These showed how valuable

truly fundamental work on one crop may, and indeed must, be to work on others. They were highly interesting in relation to work on wheat at present in progress in Cambridge.

The prolonged discussions on methods of making precise experiments on crops under field conditions originated with a paper by Mr. J. Wishart (University Reader in Statistics, School of Agriculture, Cambridge). Many other important contributions were made, written and verbal. They clarified certain questions of theory associated with statistical treatment of the results of field experiments, but were most appreciated for their clear delineation of the chief present-day difficulties of experimental procedure. Experience from the Corporation's Station at Barberton, from the Sudan, from the Imperial College of Tropical Agriculture, Trinidad, from East Africa, and from Cambridge was essentially the same, It was agreed that for accurate and dependable results in comparing the yields of different varieties of cotton, or the effect of different manures or methods of cultivation, the modern statistical method of arranging plots and analysing results (based on the work of R. A. Fisher at Rothamsted) is indispensable. But the great desirability of simplifying the work entailed in the field, especially at tropical stations not very well equipped, was strongly emphasised. On another connected point experiences were compared with much interest and advantage. In field experiments at Cambridge, from their commencement, it has been the object to find out not only how much one treatment (e.g. kind of cultivation) is better than another, as shown by the final yield, but also why. This involves periodically measuring the growth of the plants under the different treatments to find upon which stage or feature of growth it is possible to exert an influence (by the particular treatment) and thereby to increase the final yield. Now it is impossible to measure every plant in each experiment.

Certain measurements necessitate killing the plant, and in any case to measure all the plants in any ordinary field trial would be an impracticable task. Sample plants from every plot are therefore selected. How to select is itself a problem, but soluble. How many to select to get reliable, representative figures and yet to limit the necessary labour is, as the Conference concluded, so far unsolved, but pre-eminently important. Two extremely comprehensive experiments on this matter, made possible by a specific bequest, have this year been started at the School of Agriculture, Cambridge. It is hoped by these experiments to solve certain of the fundamental problems of the influence of spacing and of sampling which at present impede progress in most field investigations, and with which the work of all the Corporation's Stations is very closely concerned.

Manchester University.—In the Entomology Department during the past session experiments have been performed on the effect of temperature and humidity on the hatching of the eggs of *Dysdercus howardi*, one of the cotton stainers. A preliminary paper on the biology of this insect is at present in the press. A study of the morphology of the mouth-parts and of the feeding mechanisms have been begun.

Experiments on the effect of sudden changes in temperature upon the life-cycle of *Thrips tabaci* have been continued.

In the Mycology Department work on the cytology and spore germination of *Psalliota campestris* has been completed and published. The investigation at present in hand is a study of the morphology, cytology and parasitology of several species of fungi, all belonging to a group of plant parasites known as the Erysiphales. So far, attention has been concentrated on the development of the fruit bodies and spores, and on the field observations with

regard to overwintering of the disease. It is hoped to extend the scope of the investigations during the coming summer to the study of infection under both natural and artificially controlled conditions.

London University, King's College.—An account was given last year of the kind of work that was being undertaken in connection with the cytological side of cotton and other genera in the family of Malvaceae. Many species of Malvaceae were grown during the past year, as well as several wild species of cotton. Many more species are being grown this year from various parts of the world, and their chromosomes, which constitute the basis of heredity, are being investigated. Changes in the number and structure of these bodies are significant as a foundation for the genetics of the family. Certain members of the Bombacaceae, which are believed to be nearly related to cotton, are also being studied. An account of an investigation of the chromosomes of the 17 species and varieties in 8 genera of the Malvaceae and various species of cotton has been published by Dr. J. H. Davie. This investigation is beginning to throw light on the relationships of these forms. Secondary associations of the chromosomes in various cotton species indicate how the basic number of 13 chromosomes in Gossypium may have arisen. Dr. Davie's paper also contains certain suggestions as to how the valuable cultivated cottons have originated.

Imperial College of Science and Technology.—The several consignments of cotton seed that are received by the Corporation from one or other of the cotton-growing countries for trial in another country are sent to the Biological Field Station of the College, where they are sterilized by heat treatment and fumigation. A number of these consignments have been so treated this year, and the certificate of the officer

in charge as to their treatment is accepted by the authorities of the country to which they are sent as evidence that they fulfil the conditions regarding sterilization that govern admission of cotton seed to the various countries.

General mycological, plant-physiological and entomological work is being continued.

Rothamsted Experimental Station.—The experiments on soil cultivation, conducted by Dr. Keen and the Physics Department, have given useful and suggestive information for some years past. A new experiment has now been laid down to test, over a series of seasons, some of the more important deductions from the earlier experiments; in particular, rotary cultivation as a means of preparing a seed bed will be carefully studied.

Further development has been made in the work referred to in last year's Report, on the relations between certain physical properties of soils and the inherent fertility of these soils. An account of the main results was given at the Second Conference on Cotton-Growing Problems in July, 1934. Work has now been begun on three extensive sets of cotton-soil samples—two from Nyasaland and one from N. Transvaal. The samples were taken by local officers who have forwarded full particulars; they will keep in close touch with the investigation, and will supply yield figures and other agricultural information which can be compared with the laboratory results obtained in the Physics and Chemistry Departments at Rothamsted. Methods already worked out in these Departments will be employed, but others are under consideration. Among these is an attempt, now being developed by Dr. Schofield, to specify the " wetness " of a soil (as distinct from its actual moisture content). The method depends on

measuring the freezing-point of a moist soil; it is hoped ultimately that it may be developed for use in characterising the actual conditions of field soils and thus providing a guide to the amount and frequency of irrigations.

The Chemistry Department under Dr. Crowther has been engaged on two general problems which bear on cotton soils, viz. (*a*) the chemical factors involved in crop rotation, (*b*) the determination of the zone of active root growth at different periods. The first subject was discussed in a paper by Dr. Crowther to the Conference held in July, 1934. The second was taken up in the attempt to ascertain the importance of the subsoil nutrients for sugar beet, wheat and other deeply rooting crops. A promising method was devised for following root growth by the changes in soil moisture content, observed by means of automatic suction manometers installed at a series of depths. It was possible to decide to a week or less when sugar-beet roots began to remove water from the second, third and fourth foot of soil. The apparatus may prove serviceable in certain cotton investigations.

A detailed statistical analysis of Sudan Gezira cotton yields in relation to rainfall was completed and prepared for publication.

During the year considerable work has been done in the Entomological Department on the capturing of insects by light traps, and the analysis of the results obtained to show abundance of insects, time of flight at night, and the influence of weather conditions and moon phases on activity of nocturnal insects. The work should be of interest to cotton entomologists in view of the use of light for trapping certain cotton pests.

The Department would be very glad indeed to receive records of numbers of any other insect captured each night in a light trap, if the trap was kept going over a long period, in order that their number could be compared with figures obtained at Rothamsted.

The Statistical Department has continued to supply advice to overseas experimenters upon the interpretation of field trials, and on the problems which arise in the design of satisfactory experiments, both in agronomic and plant-breeding (applied genetics) investigations. In particular, mention may be made of a paper shortly to appear in the *Journal of Agricultural Science* by B. G. Christidis (at one time a voluntary worker in the Department and now of the Greek Cotton Research Institute). The paper deals with the effects of competition in varietal trials of cotton. As a result of consultation with the Department, the author revised his statistical methods and finally arrived at the diametrically opposite conclusion to the one he had first put forward.

Conference of Workers on Cotton-Growing Problems.

The Conference held in July last was the second of its kind organised by the Corporation, the last one having taken place in 1930. It was originally intended that the Conference should last for two days only, and that it should be held at the Corporation's offices ; but, firstly, over 30 papers were received for discussion, which made it evident that three days would have to be allotted to the Conference, and secondly, the number of those who expressed a wish to attend reached approximately 100, and as so large a number could not be accommodated in the Corporation's Council Room, arrangements were made for the meetings to be held in the rooms of the Royal Entomological Society.

The Corporation's invitation to send delegates was accepted by the Colonial Office and the Board of Trade: delegates also attended from India, the Sudan, Kenya, Uganda, Tanganyika, Northern Rhodesia, Nigeria, the Gambia, the Gold Coast, Sierra Leone, Cyprus and the Imperial College of Tropical Agriculture. Members of the Corporation's staff home on leave were present from South Africa, Southern Rhodesia, the Sudan, Nigeria and the West Indies. The Institutions in this country that were represented included the Royal Botanic Gardens, Kew, the Universities of Cambridge and Manchester, King's College, London, the Imperial College of Science and Technology, Rothamsted Experimental Station, the Shirley Institute, the Imperial Institute of Entomology, the Imperial Mycological Institute, the Imperial Bureau of Plant Genetics, the British Cotton Growing Association and the Experimental Department of the Fine Cotton Spinners' and Doublers' Association.

The Chairman and Vice-Chairman of the Executive Committee were present, and nearly all members of the Research Station Committee.

The Agenda occupied three full days, and the subjects discussed covered plant breeding and genetics, crop experimentation, cotton pests and diseases, botanical problems of the cotton plant and its fibre properties, and soil problems. From what was said at the Conference itself by those who attended and from letters subsequently received, the Conference was very successful, and the Report, which was issued in September last, has had a wide circulation, both within the Empire and in certain foreign countries.

On the evening preceding the Conference, a reception was given by Sir James Currie to those intending to be present on the following days. By the courtesy of the Council of the

Royal Society, the reception was held in the Society's rooms at Burlington House, a privilege that was greatly appreciated by all those who attended.

Spinning Tests.

The number of samples received during the year from the various cotton-growing countries of the Empire for brokers' reports and spinning tests showed an increase over last year, the total being 126, of which 44 came from the Sudan, 20 from Uganda, and 17 from Tanganyika, the remaining 45 samples being distributed between South Africa (16), Nigeria (14), West Indies (8) and Fiji (7).

As was foreshadowed in last year's Report, the Egyptian-type samples from the Sudan were this year sent in duplicate, one set being spun in the Experimental Department of the Fine Cotton Spinners' Association, the other set at the Shirley Institute, where all the tests will be carried out in future. It is gratifying to find that each set of spinning tests led to substantially the same general conclusions, so that every confidence may now be felt that the change of venue of these spinning tests will not cause any serious hiatus in the continuity of the records for these types. A point of particular interest brought out by both series of tests was that little difference in spinning quality existed between the samples of Gezira Main Crop Sakel and the comparatively new Sakel selection X1530.

An interesting set of samples, comprising seven Marie Galante selections and one Moco cotton, came from the West Indies. The Moco sample was found to be shorter but finer than the Marie Galante samples, which, though long in staple, were coarse and not suitable for counts finer than 100's. Samples from fresh selections are expected shortly. In many

respects the Marie Galante samples resembled the New Guinea × Sea Island hybrids from Fiji, seven samples of which were again tested in conjunction with Messrs. Knowles Ltd. of Bolton. The results, on the whole, were similar to those of the previous year's tests, and confirmed the opinion that these cottons are suitable for only a limited market, such as the hosiery trade, in which high strength is not the primary consideration.

The Uganda cottons included comparative samples of S.G.23/8, U.4 selections, and the local variety from the Buganda area; as in previous seasons the spinning tests showed S.G.23/8 to be definitely superior to both the U.4 selections and the local variety. Comparative trials of N.17 and S.G.29 have been proceeding for some years in the Eastern Province, with a view to the ultimate replacement of N.17 by S.G.29; samples grown in various localities in the Eastern Province were sent for spinning tests, and the results showed that there is little to choose between the two strains from the point of view of spinning quality.

The lateness of the 1932-33 South African crop caused a delay in the spinning tests of that season, and consequently no reference to them was possible in the last Report. The results are now available both for these samples and for those of the 1933-34 crop; it is noteworthy that strain 920, which for some years had displayed a superiority over the other U.4 selections, again gave the best spinning results in 1932-33, but in 1933-34 its good spinning performance was equalled by U.4/4 and nearly equalled by 921. The new selection 052 appeared to be worth further trials.

Samples from Northern Nigeria included Allen and Strain L varieties ginned on a machine gin at Daudawa and on a hand gin; there was practically no difference in spinning

quality between the machine and hand-ginned samples of Strain L, but the hand-ginned sample of Allen gave slightly better results than the machine-ginned sample. A sample of a new selection from Allen (D–31), which in the 1933 yield trial gave 39 per cent. more lint than B.C.G.A. Allen, was also tested. This sample, grown at the Botanists' Farm near Samaru, proved inferior in spinning quality to the Allen sample grown at the same place, but compared favourably with the machine-ginned sample of Allen from Bomo (3 miles from Samaru).

Seven samples of Ishan cotton were received from Southern Nigeria. The new grading regulations adopted in 1932 to bring the grading of Ishan cotton into line with that of Allen cotton in Northern Nigeria have proved unsuitable, and a revision of the grades has been under consideration; the samples sent for test had therefore been prepared to imitate different grades of Ishan cotton by the admixture of varying proportions of stained and immature lint. Tests at the Shirley Institute showed that there was little difference either in the trash contents of the samples or in the strengths of the yarns spun from them. The strengths were on the whole low, probably on account of the high hair-weights per centimetre, and, whilst Ishan cotton may prove of interest to users of Peruvian and Tanguis, the samples tested were not so white in colour as Tanguis, and at the same time they were shorter and coarser in staple.

With reference to spinning tests in general, attention may be drawn to two papers submitted at the Conference on Cotton-Growing Problems held in London last July. One is a review of spinning tests on Empire cottons, and outlines the general characteristics of Empire cottons as revealed in spinning tests carried out under the supervision of the Shirley Institute; the other is a summary of the results obtained

from statistical analyses of the data provided by spinning tests on Empire and other cottons, made in order to elucidate the relationships between the fibre properties and the spinning values of cottons. The first of these papers gives some idea of the progress of selection work in the various cotton-growing countries of the Empire, judged by the improvement in spinning quality of the cottons over a period of years, whilst the second shows that although it is possible to make a fair estimate of the spinning value of a cotton from a knowledge of the fibre properties, the spinning test is still the only reliable method of judging its real spinning value.

The Corporation again have to thank all those who kindly assist in the examination of samples and the conduct of spinning tests, including the brokers, the members of the Spinning Tests Committee and those responsible for the tests themselves at the Shirley Institute.

Mechanical Transport.

Last year it was reported that the second 15-ton unit, designed by the Mechanical Transport Directing Committee, of which Sir James Currie is Chairman, was carrying out extensive trials in Australia after having run for some 3,000 miles in this country. The trials under commercial running conditions in Australia extended over a period of 29 weeks during which over 9,000 miles were covered : the results were entirely satisfactory. There was ample freight to carry on each journey outwards from the base of operations in North Australia, but very little to be obtained in the way of return loads. The result was that the load carried over the whole distance covered during the trials averaged only 8.72 tons instead of the normal full load of 15 tons. In spite of this, after allowing for interest on the cost of the vehicles plus freight to Australia, depreciation, insurance, and all running expenses, the cost per net ton-mile worked out at under 3d.

calculated for a 48-week working year of 500 miles a week, and under 3½d. for a 38-week year. The routes over which the trials were run consisted for the most part of extremely rough bush tracks. Great interest was taken in the work of the unit by the Commonwealth Government, who purchased the vehicles on completion of the trials.

During his recent tour in Tanganyika Territory, Mr. May gave a description of the unit and the work that it was doing to Government officials and others interested in the improvement of transport facilities in the Territory, and the Colonial Development Advisory Committee have since approved a grant to the Government to enable them to purchase a similar unit ; this should greatly assist in the extension of the growing of cotton and other agricultural produce in a district situated at a considerable distance from the railway, and, by acting as a feeder, should increase the amount of rail-borne freight.

While the results secured from the 15-ton unit are most encouraging, the Committee have throughout held the belief that units carrying a larger paying load would secure greater advantages, and a preliminary design has been prepared of a unit, similarly consisting of a tractor and two trailers, but capable of carrying a paying load of 30 tons. The laden axle load would not exceed that of a standard 3-ton lorry ; so that such a unit could run satisfactorily on the earth roads found in many tropical countries. The final design and the construction of this unit can only be undertaken, however, if further funds are available.

It will be recognised that the development in road transport achieved by the Directing Committee is of direct importance to the work of the Corporation in rendering possible the economic production of cotton at a considerable distance from an existing railway.

EMPIRE COTTON GROWING CORPORATION.

EMPIRE COTTON CROPS FOR THE YEARS 1924-34, EXCLUDING INDIA.

IN BALES OF 400 lbs.

The seasons are given as covering two years (e.g., 1926–1927) because in the majority of the countries named planting takes place in one calendar year and picking in the next. In a few of these countries, however (e.g., Tanganyika, Cyprus, Malta and some of the West Indian Islands), the crop is harvested in the same year as that in which it is planted. In such cases the figures should be read as relating to the crop grown and harvested in the *latter* of the two years at the head of the column.

Country.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.	1931–32.	1932–33.	1933–34.	
(1) Anglo-Egyptian Sudan	47,652	44,912	121,131	148,118	126,115	161,536	157,769	120,310	234,964	137,384	157,625	(1)
(2) Uganda	128,604	196,038	180,859	131,728	138,486	204,057	129,969	191,305	203,265	294,828	285,986	(2)
(3) Kenya	1,653	2,250	2,046	1,232	1,241	1,984	1,518	668	1,992	4,048	6,020	(3)
(4) Tanganyika	18,793	21,724	24,280	15,966	32,954	27,785	23,135	11,351	18,039	30,834	38,087	(4)
(5) Nyasaland	6,873	7,718	4,976	2,792	4,470	6,095	9,331	4,205	5,067	5,942	10,713	(5)
(6) Northern Rhodesia ..	500	379	506	32	17	—	—	—	—	—	—	(6)
(7) Southern Rhodesia ..	1,650	4,907	6,803	639	90	280	1,481	1,974	579	355	689	(7)
(8) Union of South Africa and Swaziland ..	8,730	16,936	20,381	10,242	11,013	9,774	16,213	8,123	2,801	1,860	2,440	(8)
(9) Nigeria	25,694	39,137	47,909	27,464	20,930	32,126	43,925	18,850	6,268	24,366	28,212	(9)
10) Gold Coast	93	1,132	1,218	285	264	296	200	297	263	68	144	(10)
11) Cyprus	3,397	3,320	4,614	2,110	2,146	3,520	4,718	2,865	1,119	913	1,865	(11)
(12) Malta	573	782	507	342	541	379	293	201	41	34	32	(12)
(13) Iraq	2,400	2,540	3,500	1,800	5,200	4,700	3,300	960	409	—	—	(13)
(14) Ceylon	324	121	261	186	202	380	248	95	47	34	98	(14)
(15) Queensland	11,850	14,318	7,179	5,880	10,266	6,296	13,999	12,228	4,975	13,903	21,924	(15)
(16) Fiji	157	123	824	356	114	271	398	266	90	8	39	(16)
(17) West Indies	4,309	4,186	5,941	6,076	4,088	5,312	5,672	5,106	2,524	2,614	3,618	(17)
	263,252	360,523	432,935	355,248	358,137	464,791	412,169	378,804	482,443	517,191	557,492	
	Percentage Increase 50·6.	*Percentage Increase* 36·9.	*Percentage Increase* 20·0.	*Percentage Decrease* 17·9.	*Percentage Increase* 0·8.	*Percentage Increase* 29·7.	*Percentage Decrease* 11·3.	*Percentage Decrease* 8·0.	*Percentage Increase* 27·3.	*Percentage Increase* 7·2.	*Percentage Increase* 7·7.	

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